

CLAIMS

1) Method for manufacturing heat-insulated pipes comprising coaxial tubes sliding relative to each other with controlled friction for conveying hot/cold fluids, characterized by the following steps:

a) applying a film (3) of non-adhesive and lubricating material onto the inner surface of a first outer casing tube (2) and/or onto the outer surface of a second inner carrier tube (1);

b) fixing a series of spacers (4) made of heat-insulating material onto the inner carrier tube (1);

c) coupling and centring the outer casing tube (2) on the inner carrier tube (1) so as to form a cavity (5) between them;

d) mounting suitable sealing flanges (6) on the ends of said tubes (1, 2) coupled together in accordance with step c);

e) heating in an oven the tubes (1, 2) provided with flanges (6) and coupled together in accordance with steps c) and d);

f) supplying, via the flange or flanges (6) and by suitable means (7), liquid resin which, as a result of subsequent expansion, fills completely the cavity (5) formed between said tubes (1, 2) coupled in accordance with step c);

g) removing the flanges (6) from the ends of said tubes (1, 2) coupled together, after suitable curing of the heat-insulating material.

30

2. Method according to Claim 1, characterized in that said carrier tube (1) is coated with pre-formed jackets of heat-insulating material in the form of one or more layers, there being formed between said carrier tube (1) and the casing tube (2) a cavity of limited width filled with insulating material (8) in accordance with step f).

35

3. Method according to Claim 1, characterized in that

said pre-formed jackets comprising several layers are provided with insulating materials kept under a vacuum and optionally combined with pre-formed containers containing phase-changing materials, said layers firmly
5 adhering to each other and to the carrier tube (1).

4. Pipe for conveying hot and cold fluids obtained with the method according to Claim 1 and comprising an inner carrier tube (1), at least one layer of heat-
10 insulating material (8) and an outer casing tube (2) fitted coaxially on said carrier tube (1), characterized in that between the inner surface of said casing tube (2) and the outer surface of the heat-insulating material (8) and/or between the outer
15 surface of said carrier tube (1) and the inner surface of said heat-insulating material (8) there is provided a film of non-adhesive and lubricating material (3) able to achieve a condition of sliding with controlled friction between said heat-insulating material (8) and
20 the inner surface of the outer casing tube (2) and/or between said heat-insulating material (8) and the outer surface of said inner carrier tube (1).

5. Pipe according to Claim x, characterized in that
25 said carrier tube (1) is made of materials such as metals, reinforced and non-reinforced thermoplastic and thermosetting materials, rubbers and the like, composite materials, etc.

30 6. Pipe according to Claim 1, characterized in that said casing tube (2) is made of materials such as metals, reinforced and non-reinforced thermoplastic and thermosetting materials, rubbers and the like, composite materials, etc.

35

7. Pipe according to Claim 1, characterized in that said film (3) is based on non-adhesive materials such as thermosetting and thermoplastic materials which may or may not be heat-activated, metallic films (aluminium

or the like), thermosetting and thermoplastic films which may or may not be heat-activated, combined with metallic films, paper in ply form, glass fabrics and plastic fibres or plant fibres; separating/lubricating agents such as silicone, waxes, oils, fats, etc.

8. Pipe according to Claim 1, characterized in that said heat-insulating material (8) introduced into the cavity (5) between said tubes during step f) is based on glass wool and the like, expanded polyurethane, expanded epoxy resins, expanded phenol resins, expanded thermoplastic materials (polystyrene, polyethylene, polypropylene, polyvinyl chloride, polyethylene terephthalate and the like), expanded rubbers, expanded calcium silicate, foamed glass, syntactic foams, etc.

9. Pipe according of any one of the preceding Claims 1, 2, 4 and 7, characterized in that, after installing the tube on-site, the condition of relative sliding of the two coaxial tubes may be eliminated by fixing them together by means of introduction of resin between insulating material and surface of the tube or by heat-activating the non-adhesive film formed between insulating material and surface of the tube, so that it becomes adhesive.

True translation of the original text

Genoa,

on behalf of:

STAMP OF THE OFFICE